Project: T-350-M
Project Principal Investigator: Dr. Charles Bentley
Report No: 7 for period 12-26-10 through 1-1-11
Prepared by: Kristina Dahnert Date: 1-2-11

IDDO Personnel on Site:
Patrick Cassidy
Kristina Dahnert
Dave Ferris
Chris Gibson
Josh Goetz
Jay Johnson (CHC as of 12/28/10)
Jay Kyne
Nicolai Mortensen
Elizabeth Morton
Steve Polishinski
John Robinson

ACTIVITIES DURING PERIOD
• Happy New Year to everyone!
• The drill put up another good fight this week, you might say its best yet!
• Late Sunday, 12/26/10, the cutter and pumped simultaneously disabled and the Motor Power Supply (MPS) would not turn back on. Instrument section J was removed from service, as we suspected a thermal problem with the new motor drivers. Motor section X (with pump section Z attachment) was also removed from service, as it bled out its hydraulic oil on the tower and it was determined that the oil was flowing around the compensator piston.
• Instrument section L was installed on the drill, with increased switching speeds in the motor drivers as a means of reducing heat. Motor section Z (with pump section X attachment) was also installed on the drill.
• During the first run with the new drill configuration (Anti-torque C + Instrument section L + Motor pump Z (X)), the pump disabled itself periodically. The pump was exercised and additional core was drilled during the run.

• Upon turning the pump on during surface operations, the pump bound up and the pump motor driver in the instrument section burned out at high torque and no rotation. The drill went down hard as of 12:00 noon on Monday, 12/27/10.
• The next 2.5 days were spent disassembling all three instrument sections, combining parts from multiple sections, implementing design changes and cleaning and reassembling the instrument tubes and end caps.
Current status of the instrument sections is as follows:
   o Section J has been refurbished with one motor driver board from section L. Current limits and other safeties have been implemented in the hardware to preserve this section. This section is currently installed on the drill and appears to be sealing well.
   o Section K has sustained damage that cannot be repaired in the field.
The seals on this section did not hold and up to 3 L of drilling fluid flooded the section causing all six DDC modules (of the old motor driver configuration) to swell and burst. A couple of PCB's also exhibit some bowing and other components succumbed to fluid damage as well.
   o Section L is currently under repair. Parts were received from McMurdo on Friday, 12/31/10, including additional DDC modules and ferrite cores. The current plan is to assemble a 'hybrid' instrument section, combining one of the old style motor driver boards with DDC modules as well as one of the new motor driver boards. This section will serve as the spare section, should section J encounter trouble.
• A portion of the Arch Jamesway was turned into a workstation for disassembling motor pump sections X and Z. Work was done to determine the

cause of the mechanical binding, now believed to be caused by over-pressuring of the grease port such that the needle roller bearing was being sandwiched to such a degree that it could not rotate freely. The grease port will now be filled to a maximum depth of 0.5" from the housing to the edge of the brass fitting. Motor X was reassembled with pump X and motor Z was reassembled with pump Z. Current status of the motor pump sections is as follows:

- Section X contains a pump that has seized, a replaced seal and an improperly seating oil fitting (manageable); this section was filled with oil using the bell jar this is now a working spare if needed
- Section Y has blown a seal and will not hold hydraulic oil
- Section Z has an improperly seating oil fitting (manageable), but has a free spinning pump shaft even with a full grease port; currently the best section and is installed on the drill

• Software limits have also been implemented to prevent further damage to instrument and motor sections. There is now a 7amp cutout on the pump and a 6amp cutout on the cutter. If either limit is reached, both motors will automatically disable.
• New cutters installed prior to resuming operations
• The drill was back online as of Thursday, 12/30/10 at 3:45am. This represented approximately 64 hours of down time. The current drill configuration is now C + J + Z.
• A meeting of all drillers was held to review the fixes implemented as well as to discuss standard operations from this point forward. With only one instrument section currently available, very standard operations using the Run Operations Reference Guide combined with increased vigilance is required.
• Upon resuming standard operations, the pump began disabling itself,

owing to the very conservative software and hardware limits recently implemented. The limit with respect to noise tolerance on internal power was then raised a conservative 4% and the pump no longer self-disables under normal operations.
• Max descent speed remains at 1.2m/s while max ascent speed has risen to 1.7m/s or a 25000 N limit on cable tension. There is no longer a need to slow between 2055-1935m on ascent, as we have passed the questionable loose cable wrap. The level wind sheave appears to be holding up well to our slow speed increases and no more knocking has been heard immediately after core break.
• Minor software changes were made for ease of operations regarding motor default speeds. The trip motor will now default to the proper speed of 0.10m/s for travel on the tower and the drill motor will now default to 2.5mm/s during the coring phase.
• Height of the rear button shoes was changed early in the week from .197" to .176" in attempt to speed up the coring portion of the drill runs. The shoes have since been returned to .197" in an attempt to go easy on our one remaining instrument section.
• Bulk fluid tanks were filled
• Weekly Preventive Maintenance (PM) tasks and checklists are being completed
• A New Year's celebration was held on Friday, 12/31/10. Appetizers were served at 10:00pm followed by a countdown at midnight. Both the drill and science tech crews took a day off for holiday, needing a bit of recuperation from the stressful drill repairs throughout the week. A fun, relaxing night was had by all.
• Camp staff is again enjoying a well deserved two days off this weekend.
• Final driller's depth for the week: -2760.706 Total meters drilled this week: 77.518m

SAFETY

• The four channels on the DISC air monitor are now functioning properly after Dave and Elizabeth ran new tubing lines to both the slot and centrifuge. The oxygen sensor remains disabled at this time, but another attempt at calibration of this sensor might be made this next week.

COMMENTS

(Problems, Concerns, Recommendations, Etc.)

• With only one working instrument section at this time, we are 'babying' the drill to some extent, however have been able to make up a bit of time experimenting with faster winching speeds. The new permanent level wind tracking device is working well this season.